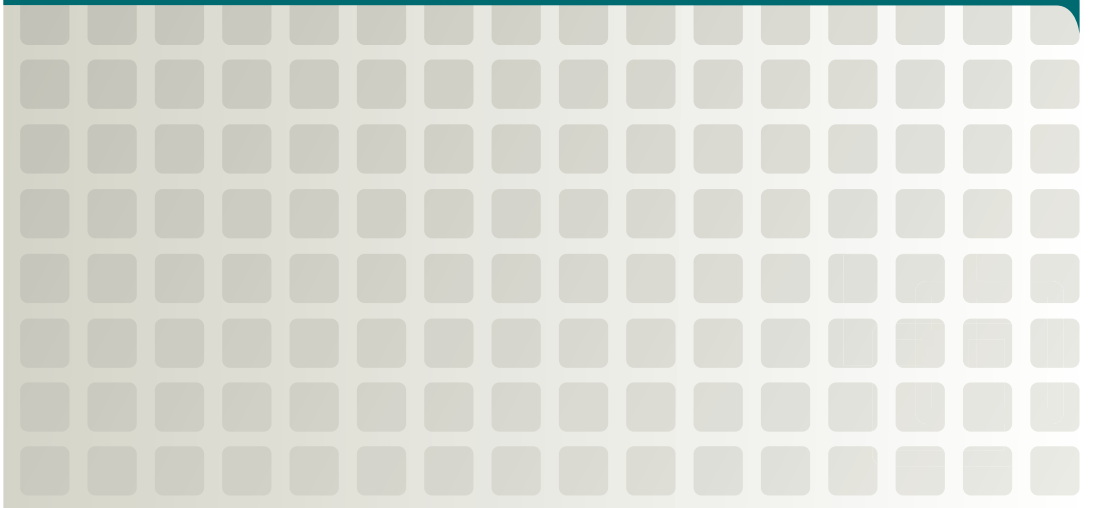
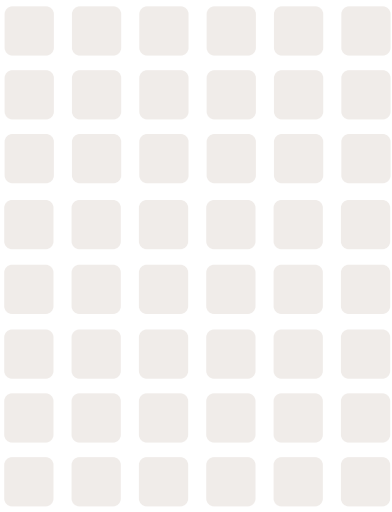




**INFINIBAND FOR  
HIGH PERFORMANCE COMPUTING**



## INFINIBAND FOR HIGH PERFORMANCE COMPUTING

Topspin solutions for high performance computing (HPC) lead the industry in capabilities and value. From low-latency standards-based communication to powerful I/O enhancements that slash administration overhead, Topspin's features are recognized by scientific research organizations, enterprises, and major OEMs alike.

HPC applications require a high performance server interconnect to achieve fast and efficient analysis of a wide range of scientific investigations. InfiniBand is a cluster interconnect technology that delivers HPC-optimized performance that is scalable and standards-based. Topspin's InfiniBand solutions have been proven to deliver superior performance in HPC environments. Some of the benefits that InfiniBand delivers are:

- Low latency messaging - under 6 microseconds
- Scalability to large node counts - thousands of nodes
- Highest bandwidth communication - 800 MB/sec
- Industry standards

**Node-to-node latency** of under six microseconds was demonstrated on Topspin InfiniBand clusters by a research team from Ohio State University (<http://nowlab.cis.ohio-state.edu/projects/mpi-iba/publication/sc03.pdf>). The OSU team used the popular Message Passing Interface (MPI) protocol to yield this low latency. MPI is a key component of many HPC applications for communicating simulation data between many compute servers within a cluster. Low latency is critical to these applications because less time is spent on communication overhead, leaving more time for valuable data processing.

**InfiniBand scalability** reaches easily into the thousands of nodes. Virginia Polytechnic Institute and State University, popularly known as Virginia Tech, created their Terascale cluster consisting of 1,100 dual-processor Apple G5 computers in 2003. Virginia Tech used InfiniBand to build a scalable HPC communications infrastructure and capture the title of the world's third most powerful supercomputer ([www.top500.org](http://www.top500.org)). Topspin's InfiniBand solutions do not stop at 1,100 nodes; configuration packages exist for more than 6,000 nodes!

**High bandwidth communication** is another of InfiniBand's strengths. Topspin's current generation products utilize 10 Gbps data links to each server, with 30 Gbps data links on the horizon. The same OSU research team mentioned earlier demonstrated MPI communications at over 800 MB/sec. This data rate compares favorably against other networking technologies sometimes found in HPC applications. Some HPC interconnects top out at just 2 Gbps. Gigabit Ethernet is an order of magnitude slower than 10-Gbps InfiniBand. 10 Gigabit Ethernet's latency is higher than InfiniBand and is currently a more expensive technology.

**Industry standards** are a central theme of InfiniBand clustering. Topspin has proven its commitment to interoperability at tests conducted by the InfiniBand Trade Association (<http://www.infinibandta.org>). Standard hardware and software ensure that HPC users do not get locked into proprietary, single-vendor solutions. Users benefit from the economies of scale that result from broad industry adoption of standards-based technologies.

